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Outbreak of aggressions and transmission of rabies in human beings by vampire bats in northeastern Brazil

Ataques a humanos por morcegos hematófagos e transmissão de raiva no nordeste do Brasil

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Abstract *Outbreaks of attacks upon human beings by vampire bats seems to be a common phenomenon in several regions of Latin America, but the occurrence of rabies infection among humans bled by vampires, is relatively low. In the present study, two outbreaks of human rabies transmitted by common vampire bats (*Desmodus rotundus*) are described from Bahia State, Northeasthern Brazil, in 1991 and 1992. The first was recorded in Aporá where 308 people were bled by vampire bats and three of these die from this zoonosis. The 2nd outbreak occurred in Conde where only five people were bled by vampires, and two deaths by rabies were registered. Our data suggest that rabies transmitted by bats basically depends on the presence of virus in the vampire bat population and not on the number of humans bled by them.*

Key-words: *Vampire bats. Rabies. Northeastern Brazil.*

Resumo *Surtos de ataques de morcegos hematófagos em seres humanos parecem ser um fenômeno comum em muitas regiões da América Latina, porém, a ocorrência de raiva humana transmitida por morcegos é baixa. No presente estudo, são descritos dois surtos de raiva em seres humanos transmitida pelo vampiro comum (*Desmodus rotundus*) no Estado da Bahia, nordeste do Brasil, em 1991 e 1992. O primeiro foi registrado em Aporá onde 308 pessoas foram sangradas pelos morcegos e três delas morreram por causa dessa zoonose. O segundo surto ocorreu em Conde, onde apenas cinco pessoas haviam sido atacadas pelos morcegos e duas mortes por raiva foram registradas. Nossos dados sugerem que a raiva transmitida pelos morcegos depende basicamente da presença do vírus na população de morcegos hematófagos e não do número de pessoas agredidas pelos mesmos.*

Palavras-chaves: *Morcegos hematófagos. Raiva. Nordeste do Brasil.*

From a diversity of 1000 species of bats around the world[6], only three species are specialized in sucking blood from warm blooded vertebrates[9 11]. These three species only live in Latin America[13], despite the legends regarding vampires and blood sucking animals existant in other regions[12]. *Desmodus rotundus* is the most common and widely spread in Central and South America[13]. It is specialized in mammalian blood, including that of humans, but can drink avian blood too. Two other species, *Diaemus youngi* and *Diphylla ecaudata*, are quite rare and preferentially drink avian blood. although the latter two species can drink mammalian blood[11], all reports of outbreaks of human aggression and human rabies caused by vampire bats are related to activities of *Desmodus rotundus*.

Several reports show the rabies virus in both non-hematophagous[2 5 15 17 18 23] and hematophagous bats, but the first are responsible for sporadic transmission while the latter for outbreaks[3 8 14]. Transmission of rabies to human beings by vampire bats has been described during the last 70 years in nine countries of Latin America (Trinidad, Guyana, Mexico, Brazil, Bolivia, Argentina, Surinam, Belize and Peru)[1 8 14].

Hematophagous bats, *Desmodus rotundus, Diphylla ecaudata and Diaemus youngi* are endemic in Latin

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America and range from northern Mexico to northern Argentina[22]. The foremost is considered to be the most responsible for rabies virus transmission among endothermic animals, mainly because of its daily requirement of food ingestion[8 24].

In the last 10 years, bats have became a very important public health issue in Brazil, due to fact that they have been transmitting human rabies [7 10]. At present, hematophagous and non-hematophagous bats are known as the second major rabies transmitter to human beings[19 20]. However, in spite of the increased notification of human rabies cases transmitted by *D. rotundus*, they are rarely studied[3 14].

The objective of the present study was to record the outbreak of aggressions and consequent human rabies caused by the common vampire bat, *Desmodus rotundus*, in Aporá (1991) and Conde (1992), two small towns of Bahia State, northeastern Brazil.

MATERIAL AND METHODS

During 1995 and 1996, we accessed the 1986-1995 specific anti-rabies' vaccination files (National Foundation of Health, Ministry of Health) from Health Services of Aporá and Conde city. Furthermore, the population of the common vampire bats and its attacks upon human beings reported in 1991 and 1992, which have caused five deaths by rabies was studied. Files were only selected of people bitten by bats and which received anti-rabies treatment in either of the localities. We interviewed some of the people that were bled and families submitted to vampire bat aggressions. Four night sessions of bat capture in Aporá and six in Conde were undertaken during 1995-96. Fine nets were used to capture vampire bats around cattle and horse corrals in several small farms.

Aporá is a little municipality with approximately 16,000 inhabitants in north of Bahia state, 188km from Salvador, the state capitol. In 1989, there were various small farms and about 38,000 heads of cattle. The climate is dry to sub-humid and the typical vegetation is caatinga[4]. Conde is similar to Aporá in size and population. It is also a little town with 16,000 inhabitants and is located in the north coastal region of Bahia State, 205km from Salvador. In 1989, there were a few small farms and about 32,000 heads of cattle. The economy has been growing due to increased tourist activities and sea fishing activities in some villages. The original vegetation was the Atlantic Forest, actually greatly modified by deforestation, roads and coconut palm crops. There is no reference of caves in either region, which they could be used by vampire bats as diurnal roost.

In Aporá, there are two Health Services where the most part of the anti-rabies treatment was done, while in Conde, there was only one. The human material was sent to the Hospital Couto Maia from Salvador, the main zoonosis diseases hospital of the state, for rabies diagnosis using immunofluorescence and biological test. For the same procedure, all individual vampire bats (19 *Desmodus rotundus* in Conde and five in Aporá), captured in 1995-1996, were sent to the LACEN-SESAB, but no bats were found to be infected by rabies virus.

RESULTS

Our investigation in Aporá showed that few cases of human aggression by vampire bats were reported before the outbreak of 1991. Between 1987 and 1989 only one case each year was notified by the Public Health Services, however, in 1990 human aggression grew to 32 reaching a peak of 308 in 1991, and three persons died with positive identification for rabies, transmitted by *D. rotundus*. The victims were adults and not related, but they were neighbors in Chapada village. This major outbreak of aggression, did not happen in a short period but was recorded throughout the year, though mainly in the dry season (Figure 1). In 1992, after chemical control of the vampire bat population carried out by the State Program of Rabies Control, the attacks decreased and vampire bats bled only two people. In the following two years (1993 and 1994) no case of this type was reported.

Few cases of human aggression by vampire bats occurred in Conde from 1986 to 1995 (Figure 2). There were one isolated case in the first two years, 5 in 1992, 8 in 1994 and finally, two in 1995. No vampire bat control program was undertaken in this region. Regarding human aggression In 1992, one was registered in January, three in October and one in November. In spite of the few cases of attacks in 1992, two children (from the same family, living in the same house) died in October with positive laboratorial diagnosis of rabies. They were from Seribinha, a fishing village, and lived in a house where all five children had been attacked by bats on different occasions. The children were not admitted to the Health Post; therefore there are no records about this accident in the Hospital Couto Maia.

DISCUSSION

In northeastern Brazil, during the dry season, it is common to transport cattle to a different region in order to save them from drought and starvation. This fact probably accounts for the increase (53% of attacks) of the great outbreak of aggression in Aporá, from January to March, since vampire bats were forced to find another source of food, including human beings. This change of food source as already been described in *D. rotundus,*

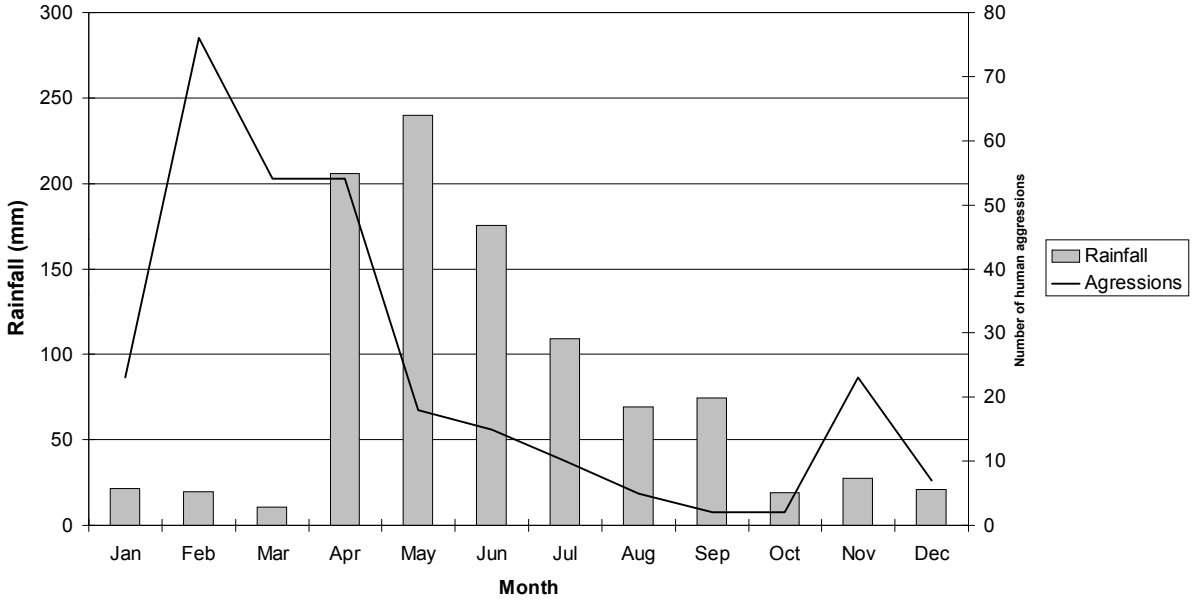

Figure 1 - Average rainfall (bars) and number of bats attacks upon human beings (line) by month in Apora in 1991.

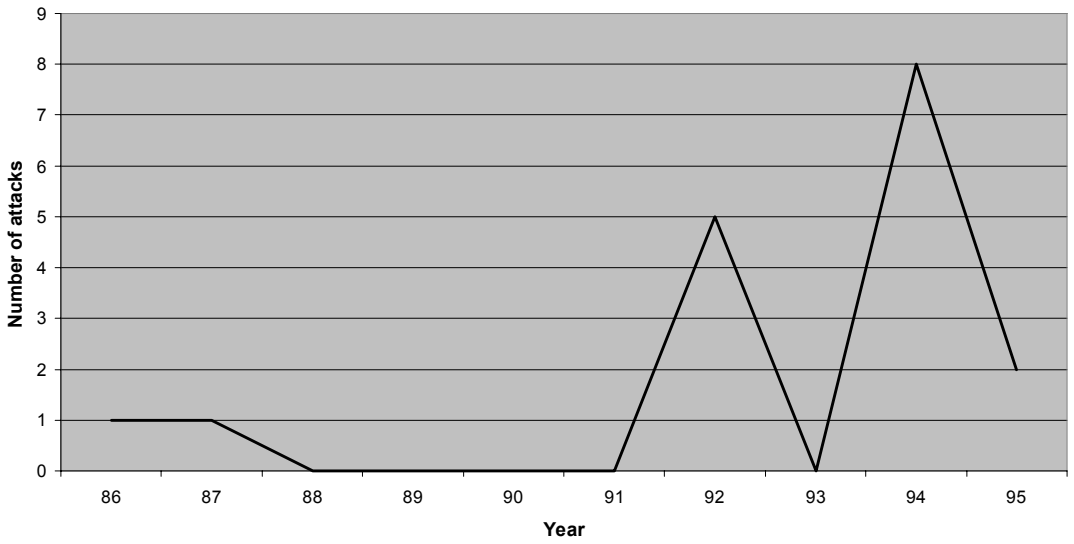

Figure 2 - Number of bat attacks upon human beings in Conde, among 1986/1995.

since in the Peruvian jungle, after pigs are slaughtered, the number of aggressions against human beings by vampire bats increases[14].

Deaths in Aporá occurred in June to July, probably as a consequence of attacks between April to May, due to the rabid virus incubation cycle (about 20 to 60 days)[21,25]. However, attacks had occurred since February-1990, showing that prevent campaigns such as educational and vaccination programs could prevent these deaths.

In both outbreaks differences were observed in the number of attacks and aggressions by bats (308 in Aporá and five in Conde), but rabies was nevertheless transmitted. Probably, a few individuals of *Desmodus* were rabies infected and capable of transmitting the virus: two or three bats in Aporá and only one in Conde.

Although public health entities are aware of these aggressions upon humans by vampires, preventative action before the outbreaks (educational program, screening of people attacked and control of bat populations) does not occur on a routine basis [7,16].

Rabies virus can be transmitted independent of the number of attacks and aggressor bats, but is dependent

on the presence of rabid bats. Prevention actions should be undertaken every time that attacks by bats have been notified.

Interviews made in both municipalities showed that other attacks had probably occurred before, and so, there is evidence of under notification. This fact was also observed by W. Uieda (unpublished data), when he interviewed gold miners in Mato Grosso (Brazil) in 1990/1992, which reinforces the necessity of educational programs and other preventative action.

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